## What is claimed is:

[Claim 1]

1. A viscometer for testing the viscosity of a test specimen comprising:

a thermal block;

a thermo device to control temperature of said thermal block;

a temperature sensor to sense temperature of said thermal block;

a capillary tube embedded in said thermal block such that said capillary tube is in thermal contact with said thermal block;

an entrance tube connected to said capillary tube and embedded in said thermal block, said entrance tube providing a pathway to said capillary tube from outside said thermal block;

a velocity tube connected to said capillary tube and embedded in said thermal block, said velocity tube providing a pathway to said capillary tube from outside said thermal block; and

at least two flow sensors aligned along said velocity tube adapted to measure velocity of the test specimen in said velocity tube.

[Claim 2]

2. The viscometer of claim 1, wherein said entrance tube is larger than said capillary tube adapted to provide easy entrance of the test specimen and ensure a sufficient supply of thermally equilibrated test specimen to keep said capillary filled during measurement.

[Claim 3] 3. The viscometer of claim 1, wherein said velocity tube is larger than said capillary tube adapted to provide a slow down effect for entrance of the test specimen into said velocity tube.

[Claim 4] 4. The viscometer of claim 1, wherein said entrance tube, capillary tube and velocity tubes have an inside surface made of an easily cleaned material.

[Claim 5] 5. The viscometer of claim 4, wherein said easily cleaned material is a fluoroplastic.

[Claim 6] 6. The viscometer of claim 1, further including a test specimen source, a compressed gas source and an entrance valve to attached to said entrance tube, said entrance valve also attached to said test specimen

source and said compressed gas source such as to allow switching access to said entrance tube between said test specimen source and said compressed gas source.

[Claim 7] 7. The viscometer of claim 1, further including a vent source, a cleaning source and an vent valve to attached to said velocity tube, said vent valve also attached to said vent source and said cleaning source such as to allow switching access to said velocity tube between said vent source and said cleaning source.

[Claim 8]

8. The viscometer of claim 6, further including a vent source, a cleaning source and an vent valve to attached to said velocity tube, said vent valve also attached to said vent source and said cleaning source such as to allow switching access to said velocity tube between said vent source and said cleaning source.

[Claim 9]

9. The viscometer of claim 1, further including a compressed gas source connected to said entrance tube.

[Claim 10] 10. The viscometer of claim 1, further including a cleaning source connected to said velocity tube.

[Claim 11] 11. The viscometer of claim 10, wherein internal diameters of said entrance and velocity tubes are the same to ensure steady flow of the test specimen.

[Claim 12] 12. The viscometer of claim 1, further including a start sensor positioned to detect the test specimen at a start position prior to said at least two flow sensors.

[Claim 13] 13. The viscometer of claim 1, wherein said entrance tube is larger than said capillary tube adapted to provide easy entrance of the test specimen; wherein said velocity tube is larger than said capillary tube adapted

to provide a slow down effect for entrance of the test specimen into said velocity tube; wherein said entrance tube, capillary tube and velocity tubes have an inside surface made of an easily cleaned material; further including a test specimen source, a compressed gas source and an entrance valve to attached to said entrance tube, said entrance valve also attached to said test specimen source and said compressed gas source such as to allow switching access to said entrance tube between said test specimen source and said compressed gas source; and further including a vent source, a cleaning source and an vent valve to attached to said velocity tube, said vent valve also attached to said vent source and said cleaning source such as to allow switching access to said velocity tube between said vent source and said cleaning source.

[Claim 14] 14. The viscometer of claim 13, further including a start sensor positioned to detect the test specimen at a start position prior to said at least two flow sensors.

[Claim 15]

15. The viscometer of claim 13, wherein said easily cleaned material is a fluoroplastic.

[Claim 16] 16. The viscometer of claim 13, wherein said velocity tube is of a clear material and said at least two flow sensors are paired optical sensors and light emitters.

[Claim 17] 17. The viscometer of claim 15, wherein said velocity tube is of a clear material and said at least two flow sensors are paired optical sensors and light emitters.

[Claim 18] 18. The viscometer of claim 12, further including an additional flow sensor upstream of said capillary tube and said start sensor.

[Claim 19] 19. The viscometer of claim 14, further including an additional flow sensor upstream of said capillary tube and said start sensor.

[Claim 20] 20. A method of measuring viscosity of a test specimen using a viscometer including a thermal block, a capillary tube embedded in the thermal block such that the capillary tube is in thermal contact with the thermal block, an entrance tube connected to the capillary tube and embedded in the thermal block with the entrance tube providing a pathway to the capillary tube from outside the thermal block, a velocity tube connected to the capillary tube and embedded in the thermal block with velocity tube providing a pathway to the capillary tube from outside the thermal block, at least two consecutive flow sensors aligned along the velocity tube to measure velocity of the test specimen in the velocity tube, comprising:

beginning with an empty viscometer;

delivering the test specimen to the connection of the capillary tube and the velocity tube by pushing the test specimen from behind with compressed gas through the entrance tube and the capillary tube;

temporarily stopping flow of the test specimen to allow the test specimen to equilibrate to a target temperature in the thermal block, whereby temperature of the thermal block is controlled by a thermal device;

once the temperature of the test specimen is equilibrated, allowing the compressed gas to push the test specimen forward into the velocity tube at a fixed pressure while simultaneously venting the velocity tube from outside the thermal block;

using the flow sensors placed along the flow path of the velocity tube to monitor passing of a leading meniscus of the test specimen; and

recording time it takes a leading meniscus of the test specimen to travel between the at least two consecutive flow sensors to determine velocity of the flow between the at least two consecutive flow sensors.

[Claim 21] 21. The method of claim 20, further including connecting the velocity tube to a cleaning source and connecting the entrance tube to a test specimen receptacle; introducing a pressurized gas into the velocity tube to move the test specimen backwards into the test specimen receptacle by way of the capillary tube and entrance tube; forcing a solvent into the velocity tube towards the capillary tube to clean the velocity tube, the capillary tube and the

entrance tube; and introducing a drying gas through the same path as the solvent to dry the velocity tube, the capillary tube and the entrance tube.

[Claim 22]

22. The method of claim 21, further including alternate introduction of drying gas and solvent in a repeated sequence to ensure thorough cleaning and drying of the velocity tube, the capillary tube and the entrance tube.

[Claim 23] 23. The method of claim 20, using a start sensor at the connection of the velocity tube and capillary to determine when the leading meniscus of the test specimen reaches that connection in order to stop the flow and allow the test specimen to equilibrate to the temperature of the thermal block.

[Claim 24] 24. The method of claim 20, substituting pushing the test specimen with the compressed gas with pulling the test specimen with a vacuum attached to the velocity tube.

[Claim 25] 25. The method of claim 20, further including calibrating the viscometer using at least one standard sample with a known viscosity by determining the time it takes the standard sample travel between consecutive flow sensors in the viscometer and determine a calibration constant based on the time and the viscosity of the standard sample by dividing viscosity with the time and further calculating the viscosity of the test specimen by multiplying flow time of the test specimen with the calibration constant.

[Claim 26] 26. The method of claim 25, wherein viscosity value of the standard sample is similar to that of the unknown test specimen.

[Claim 27] 27. The method of claim 20, further including changing the shear rate of the test specimen by changing the pressure of the compressed gas pushing the test specimen.

[Claim 28] 28. The method of claim 20, wherein said entrance tube, capillary tube and velocity tubes have an inside surface made of an easily cleaned material.

[Claim 29] 29. The method of claim 20, wherein said easily cleaned material is a fluoroplastic.